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The Truth About Hormones

A radio discussion over WGN and the Mutual Broadcasting System

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The Truth About Hormones

MR. MCBURNEY: Our speakers today are Dr. Percy Julian, Director of Research in the Soya Products Division of The Glidden Company—What kind of research are you doing, Dr. Julian?

MR. JULIAN: Our principal efforts are in the field of the synthesis of the sex and adrenal-cortical hormones.

MR. MCBURNEY: And how do soybeans enter into this business?

MR. JULIAN: Simply because in soybean oil, fortunately for us, there are hidden these beautiful white crystals or compounds we call sterols, derived (the word is derived) from the Greek word, "stereos," meaning space, and the "ols" on the end means that they are alcohols. They are, therefore, alcohols occupying a great deal of space as molecules.

MR. MCBURNEY: Actually, in addition to these hormones, you derive other products from soybeans. don't you, such as paints and plastics?

Soya Products

MR. JULIAN: We derive other products such as soya proteins, the soya phosphatids, and from those we prepare a number of other things.

MR. MCBURNEY: Our second speaker is Dr. Ronald R. Greene, Associate Professor of Obstetrics and Gynecology in the Northwestern University Medical School. Why are you interested in hormones, Dr. Greene?

DR. GREENE: Hormones are very important in certain functions in the female, and I think that is why I am interested in them. Actually, I became interested in the research—the physiologic angle—many, many years ago, and have continued that interest both from that angle and from the clinical side, or in the practice of my specialty.

MR. MCBURNEY: We are also pleased to present Dr. Emory G. Grimm, of the Northwestern University Medical School. Dr. Grimm is an endocrinologist. Now, what is that, Doctor, and how do hormones enter into your field?

DR. GRIMM: Well, an endocrinologist sees patients who either have or think they have endocrine diseases. Initially I chose this specialty simply because it interested me, and I never thought I would make money with it, but in the last twenty years, endocrinology has become rather important. The newspapers write about it.

I treat stout ladies and stout men, and then I get children who are stunted in growth, or people whose thyroids are deficient, or who suffer from sex disturbances.

MR. MCBURNEY: How do hormones enter into this field of endocrinology?

DR. GRIMM: The hormones are the secretions of these endocrine glands, or ductless glands as we call them, and when something goes wrong with them, then the endocrinologist is called.

MR. MCBURNEY: What is a hormone, anyway? How would you define it or describe it, Dr. Grimm?

Endocrine Glands

DR. GRIMM: They are the secretions of the endocrine or ductless glands. It is characteristic that these glands secrete substances which, in very minute amounts, will stimulate organs far away from them, because the substances are carried around in the blood stream, the lymph stream, and so forth.

MR. MCBURNEY: Are the sex hormones the most important, would you say?

DR. GREENE: That would depend entirely on the point of view of the questioner. Actually, the answer would be no, since the individual can survive without his sex hormones—or her sex hormones—but the hormones of other glands, at least some of them, are absolutely essential for life.

I think Dr. Grimm ought to carry the ball on that; it is more in his field.

DR. GRIMM: In a more "laymanish" way, I would say that butter, bread and meat are rather essential things, whereas cherry pie is a luxury article, and I would say that the sex hormone is a luxury article in so far as we can live without sex function, but we wouldn't like it very much.

MR. MCBURNEY: I don't know whether we should pursue this delightful analogy too far here.

DR. GREENE: May I interject just one second? Maybe I'll have to backtrack a little. If you want to use the word "important" in the sense of the continuity of the race, perhaps the sex hormones are most important, but if you are looking at it from the point of view of the individual, they are not.

MR. MCBURNEY: Are there different kinds of sex hormones, Julian?

MR. JULIAN: Yes, there are several different kinds. For simplicity, we have the pituitary hormones, which regulate—

MR. MCBURNEY: I was asking about the sex hormones specifically.

Sex Hormones

MR. JULIAN: Yes, we have the male hormones and the female hormones. You might put it that way. The male hormones are called the androgenic hormones. There are many of the female hormones; the principal one is estrone. Among the female hormones you have the so-called feminizing hormone, and the pregnancy hormone. The pregnancy hormone being progesterone, and the feminizing hormone, the principal one, being estrone—one works in one way and one works another way.

MR. MCBURNEY: You mentioned the pituitary gland. I take it there are a great variety of these hormones other than the sex hormones. Am I right in that?

MR. JULIAN: Oh, yes. The word, "hormone," is a broad term. We were just talking about the effect there, whether we could do without them.

I think, Grimm, if you actually take out a man's adrenal glands, he can't survive, can he?

DR. GRIMM: Well, he couldn't before. Today he can, with the help of men like you, but formerly such people died. They had Addison's disease; they got bronzed; they became weak; their blood pressure dropped; their blood sugar dropped, and they eventually died. Today you can keep them alive with cortisone.

MR. MCBURNEY: What are some of these other hormones, Dr. Grimm?

DR. GRIMM: Well, the pituitary hormones, as mentioned before, the thyroid hormone, the insulin used in diabetes; then there are the various sex hormones and others. So there are quite a few of them.

MR. MCBURNEY: Where do we get these, Julian?

MR. JULIAN: Well, formerly, of course, we got them by extraction of the glands. It is interesting to note that in the adrenal glands there are 28 substances, crystalline substances, that have been extracted. Six of these are very definitely active hormones, among them, of course, cortisone, Reichstein's so-called Substance S, Kendall's Compound F and so on. Most of the hormones, with the exception of the protein hormones, are now synthesized in the laboratory. We actually make them from these sterols, these big alcohols that I talked to you about.

From the Mexican sapogenins, as we call them—that is, this so-called Mexican yam that we have read a great deal about in the papers—and from the animal sterol, cholesterol, and from soya sterols in the soybean—

MR. MCBURNEY: Are these rather recent developments that you are talking about?

Early Developments

MR. JULIAN: These developments go back to around 1930. They really began in 1932, when Windaus and Wieland, in the great laboratory at Munich, actually elucidated the structure of cholesterol. There followed quite rapidly upon that, the collection of these steroid hormones, the ones that are developed from sterols, with cholesterol. Then later came the com-

mercial isolation in this country, in which our labortories played a part, with soya sterols, on a large scale. Then the Mexican sapogenins entered the picture, so we have a number of sources of these.

MR. MCBURNEY: We hear a lot about cortisone and ACTH. They are fairly recent developments, are they not?

MR. JULIAN: Yes. The chemistry of it began around 1942 in this country, actively, with Kendall and Reichstein, both of whom elucidated the structures of many of these adreno-cortical hormones, among which cortisone is today the most exciting one and the most important one.

DR. GREENE: May I just clarify one point? ACTH, unfortunately still has to be extracted from the pituitary glands of animals. It is one of the more complex hormones, if you want; it is a protein hormone, and even the great Dr. Julian has not been able to make it in the test tube yet.

MR. MCBURNEY: What are the effects of these hormones, anyway, Dr. Grimm? I'm thinking particularly of the effects on the physical characteristics of individuals.

DR. GRIMM: Well, they are of very great importance, because all these hormones act on end organs, but they also act on each other, and a certain balance has to be maintained between the hormones. When the hormonal balance is disturbed, or when the hormones are insufficient in amount, then you may find very grave changes in the length, growth, the height of the growing child, in the stature of an individual, in the fat deposits, and the like. Also, the skin, the nails and hair are all influenced by hormones.

Influence on Structure

MR. MCBURNEY: Well, of course, we all know there are enormous differences in the physical structures of individuals. I am thinking of adult individuals. Do you think that the hormones are responsible for those differences to a considerable extent?

DR. GRIMM: To a considerable extent, but there are hereditary factors. There are nutritional factors, too. For instance, if you went into the concentration camps of Nazi Germany, you would find that youngsters couldn't grow as tall as those in a country where they were well fed.

DR. GREENE: But, Grimm, wasn't that due, perhaps, to the fact that the inadequate diet caused the endocrine glands to underfunction, and, in turn, growth was then disturbed?

Apropos of what you started out to say, don't you think it would be interesting to get a little more specific, and state what the pituitary glands do when they are not functioning from early infancy, and when they function too much?

DR. GRIMM: Some of this, of course, we have duplicated in animals before we used some of these hormones in human beings, and when the pituitary glands don't work properly, there are many other glands that are affected by that.

The pituitary gland is called the master gland, which I think is slightly exaggerated. Going back to the Fascist countries —to the Russians, now—the master there is one person who gives orders, and the rest of them obey. If you don't obey, you die.

MR. MCBURNEY: You think the pituitary is not that kind of a master?

DR. GRIMM: Absolutely not, because the organs that receive commands from the pituitary gland can issue orders to the pituitary gland, too, and the pituitary gland will have to obey and respond.

Alter Characteristics?

MR. MCBURNEY: Well, can you alter physical characteristics by giving these hormones to people, Greene?

DR. GREENE: You certainly can, if given at the right time in development, with some of the hormones; other hormones will act and alter physical characteristics even though given very late in life.

For example, there is a certain type of a very small, stupid individual called a cretin, resulting from lack of thyroid hormone, which starts, actually, when it is in the mother's womb. Well, if thyroid

is given to the mother during pregnancy, (you see, she is lacking in thyroid herself) and during the development of that child, it can end up as a fairly normal individual.

MR. MCBURNEY: Can male and female characteristics be altered by hormones?

DR. GREENE: Very easily, if these characteristics are under-developed due to a deficiency. For example, with the occasional male who reaches adulthood with very low-grade function of his testicles, while you can't change his general body build, you can certainly cause him to grow a normal amount of hair on his face, cause his voice to change and his sexual organs to develop to fairly normal size.

MR. MCBURNEY: I was wondering about the psychological characteristics of persons deficient in these hormones. Is that a factor, Dr. Grimm, of any importance?

DR. GRIMM: It is a very important factor. Of course, it is a little hard to evaluate, at times, but taking Dr. Greene's example of the cretin, for instance, this cretin, if not given the amount of thyroid it needs, will develop into an individual with a very low I. Q., whereas, if you give thyroid early enough then the brain will be affected by it, and the I. Q. will be a good deal better.

A way of proving that the glands do have a profound influence on the psyche, for instance, is the experience that we had of late with ACTH, because when Hench and Polley, of Mayo's, came out and treated—

MR. MCBURNEY: That's the Mayo Clinic?

Psychological Effect

DR. GRIMM: The Mayo Clinic. When they treated the arthritics for the first time, long before the joints became better, these people already felt better. They couldn't move their arms, let's say, or their fingers, but they became very lively, they became loquacious, they became boisterous. When such psychic effect exerted by ACTH becomes very intense, particularly in predisposed individuals, we will even see psychotic manifestations. Such people may be manic or depressed. They may act peculiarly. Some of them have to be put into the psychopathic ward. This stops, of course, when you stop the ACTH.

MR. BURNEY: We were talking about these sex hormones.

MR. JULIAN: May I interrupt there just one moment, Dr. Grimm?

MR. MCBURNEY: Yes, go ahead, Dr. Julian.

MR. JULIAN: It has been said that in all these cases of rheumatoid arthritis, the patient did have a sense of well-being immediately after the administration of the hormone, and this has occurred in the treatment of certain other diseases with hormones.

Treatment of Arthritis

MR. MCBURNEY: Well, of course, this cortisone has been hailed in the treatment of arthritis. You doctors subscribe to that, I take it.

DR. GRIMM: Yes.

MR. MCBURNEY: Apparently they have had some rather dramatic results. Is that true? I have gathered that from the literature, at least, the popular literature.

DR. GREENE: Alleviation of arthritis; permanent cure of arthritis—that is still another question. It's out of my field, I might add. Dr. Grimm should explain it.

DR. GRIMM: Well, the unfortunate part is that the great majority of these cases have to be continued. The treatment has to be continued. There have been cases reported where the arthritis disappeared entirely.

Or, for instance, take gout. In gout, an attack can be shortened considerably by ACTH.

Today we have some of these formerly very expensive substances put out in cheaper form, and also in a form where it can be taken in tablets, so that the patient does not have to run to the doctor all the time.

MR. MCBURNEY: How costly are these hormones that you are synthesizing, Dr. Julian?

MR. JULIAN: Well, they are still too costly, but it should be mentioned that the cost

is decreasing all the time. For example, back in 1941 a pound of progesterone cost about $70,000.

MR. MCBURNEY: What is progesterone?

MR. JULIAN: That is this pregnancy hormone.

MR. MCBURNEY: One of the female hormones.

MR. JULIAN: That's right; one of the female hormones.

Today a pound of progesterone costs you somewhere around $200 or $300.

MR. MCBURNEY: How about cortisone?

MR. JULIAN: Cortisone is still an expensive hormone. However, when you think about the fact that a gram of progesterone cost $140 in 1942, and a gram of cortisone today can be secured for around $20 by the distributor, you can see that cortisone is still—in terms of what we have known in the past, with reference to the cost of hormones—a reasonably priced substance.

DR. GRIMM: May I cut in here and say that it is very reasonably priced—that is, ACTH and cortisone—when you consider that there are certain deadly diseases that are aided by it. For instance, just to name three skin diseases with fancy names—lupus erythematosus, dermatomyositis and pemphigus—with these diseases most patients die, but today, with cortisone and ACTH, you can keep them alive in a certain percentage of cases, and you can also get them "over the hump" once in a while so that they become entirely well. They may later on have a recurrence, but they may not, so the price wouldn't be too much.

Cancer Treatment?

MR. MCBURNEY: Do these hormones enter at all into the treatment of cancer? Can you stop cancer with hormones, Dr. Greene?

DR. GREENE: You'd have to define the term, "stop," or say what you mean, to answer that very well. They won't cure cancer, at least in our present state of knowledge, but in certain types of cancer that have already spread into or throughout the patient's body, they certainly will slow down the progress of this cancer. They will relieve pain, and will make the patient feel tremendously better. Unfortunately, eventually, the cancer will start growing again, and the patient will die, but with the cancer of the prostate, for example, in which the patients will die in a relatively limited period of time, with treatment with very high doses of female sex hormones, they may live for years in comfort, carrying on their usual activities, their usual business, supporting their families, and so on.

MR. JULIAN: The question is certainly hard to answer. I don't think we swore here to tell the whole truth, so help us, God, because we don't know the whole truth about hormones.

DR. GREENE: I would second that.

MR. JULIAN: But we certainly can hold out some hope, it seems to me. At least it is my hobby, to keep hoping [laughter] that in some way we are going to find out what the relationship is between cancer and the metabolism of these hormones, and that some day, probably, we may find the proper combination that may halt the thing in its incipiency.

Of course, Dr. Grimm should answer that, rather than a poor chemist, but that is the hope of the research chemist, at any rate.

DR. GRIMM: I think you know much more about that than I could ever tell. I think you're absolutely right.

DR. GREENE: At any rate, it's a worthwhile hope to hang onto.

MR. MCBURNEY: In the presence of all this deference here, as a poor layman, may I ask a very naive question? Can you use these hormones to help restore youth?

'Cannot Restore Youth'

DR. GREENE: May I answer that, please? [Laughter] The answer is no. As a generality, you cannot restore youth. It is not the miraculous "fountain of youth." On the other hand, you can restore normal structure, normal function of certain structures, with the sex hormones, for example.

Dr. Grimm, you mentioned another example a while ago somewhat along this line. Would you take over?

DR. GRIMM: I would just say that it was thought naively by Brown-Sequard, one of the founders of endocrinology, that he could restore youth. He was a man in his late seventies, and he injected extracts of the testes of a bull into himself.

DR. GREENE: There was the scientific spirit, using himself as a guinea pig. [Laughter]

DR. GRIMM: Well, he reported that he gained in weight, his skin looked better, and his wrinkles, he said, disappeared.

DR. GREENE: That's what *he* said.

'Auto-Suggestion'

DR. GRIMM: And his strength increased. A good deal of this was, of course, auto-suggestion; we all feel better when we see the doctor, or, when you go to the dentist's office, your tooth doesn't hurt you so much—it was something on that score.

I would say this much: I certainly side with Dr. Greene. You cannot restore youth, but if you need, for instance, more thyroid, the thyroid will help you; if you need more sex hormones, the sex hormones will do certain things; particularly, testosterone, the male sex hormone, which will also increase muscle volume and cause a certain sense of well-being.

MR. JULIAN: I guess Brown-Sequard must have thought like a medical layman such as I must think when he looks at this big bull with his handsome neck and handsome characteristics, and then looks over at the poor old, broken-down steer. He must think that something might come of this experiment, if it is due to the sex hormones at all.

DR. GREENE: The only trouble with his technique was that he used a watery extract, and the male sex hormone is so insoluble in water that I doubt if his extract had any particular amount of it.

MR. JULIAN: Quite right.

MR. MCBURNEY: I take it these sex hormones are helpful in your practice, Dr. Greene. I gathered that from your opening statement.

DR. GREENE: They certainly are, and when used properly are extremely valuable. I think a good example is in the treatment of some women in the change of life, or the climacteric. Probably less than half of the women have any great trouble during that period, but the ones who do have trouble are greatly benefited by the proper administration of female sex hormone. And may I add that it can be given by mouth, and that hypodermic injections are very rarely necessary.

'Dangers in Use'

MR. MCBURNEY: Are there any dangers in the use of these hormones?

MR. JULIAN: Yes. I would say that probably the greatest danger might lie in the attempted use of them by the layman without consulting a physician. As I said before, we don't know the whole truth, by any means, about these hormones.

Marrion of Edinburg wrote recently that the glorious future in the field of hormones lies in the study of the metabolism of the hormones, and I think that is what happens to them in the body—why Nature put them there. I am a great believer in the natural economy that Nature put them there for very definite and beautiful uses, and I think the danger lies in our lack of understanding of what the purpose is.

DR. GRIMM: Well, may I pitch in here? There are dangers in all sorts of hormones, hormones that are not necessarily the most potent ones. Take thyroid, for instance. There are a lot of people who are stout for no other reason than that they eat more than their bodies can take care of, and they take thyroid in order to reduce. Some of them will do that without even seeing a doctor. Others will see a doctor, but then continue on without supervision.

Now, if you take too much thyroid, you may get certain manifestations such as pounding of the heart, shortness of breath, excessive perspiration, shakiness and the like, with inability to sleep, and if very much is taken, these people may become very sick.

In treatment with cortisone and ACTH —Dr. Julian knows that very well—certain manifestations are well known, particularly if the patient is treated for a long time. Women may become hairy in the face. Of course, a good doctor will watch that. Women's faces will become round. They may retain salt, and therefore their blood pressure may rise, or their mineral balance may change, so they may run into trouble.

MR. MCBURNEY: Are you suggesting that you can alter male and female characteristics through the administration of these male and female hormones?

DR. GREENE: Do you mean physical structure?

MR. MCBURNEY: Physical structures.

DR. GREENE: In a sense, you can. In the case of women who are deficient and have been deficient in female sex hormones, with proper administration of that substance, you can cause them to develop normal breasts and get normal distribution of fat around the hips, and so on. However, women whose ovaries have been functioning normally and who have breasts that are too small to suit them—unfortunately, sex hormones can't do them any good.

MR. MCBURNEY: Can you buy these substances, Dr. Julian, in a drug store? How are they available to people? Through doctors' prescriptions?

MR. JULIAN: Well, the Federal Drug Administration is doing a wonderful job in trying to regulate how they are secured. For example, you can't ship crystalline cortisone out of this country, or export it, because it might be exploited—diluted and used to bad advantage. They are pretty well sold on doctors' prescriptions.

MR. MCBURNEY: And should be, I take it.

MR. JULIAN: And should be, for the most part.

MR. MCBURNEY: I think a lot of people confuse these hormones with vitamins and other substances that are bought in the drug store. Do you ever run into that?

MR. JULIAN: Oh, yes. Just yesterday a druggist was selling vitamins across the counter. The buyer assumed these were hormone substances. That is an ordinary confusion that is sometimes rather dangerous.

DR. GREENE: Don't forget Vitamin E, that they call the "fertility" or "reproductive" hormone.

MR. JULIAN: Yes, which it is not.

MR. MCBURNEY: Do you look forward to considerable development in this field? I know you do.

MR. JULIAN: Oh, naturally, I have to make a living. [Laughter]

ANNOUNCER: I'm sorry, gentlemen, but our time is up.

Suggested Reading

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and M. Helen Perkins, Reference Department,
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The fantastic tale of the successful search for vegetable materials from which to make hormones cheaply.

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Newsweek 37:52, Mar. 10, '51. "Hormones from Tomatoes."

Brief announcement of the new method of producing the sex hormones, testosterone and progesterone, from the leaves of tomato plants.

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Contrast between tubercular rabbits who were given cortisone, and those who were not.

Science Digest 30:50-1, Aug., '51. "Mental Peril in Abrupt Pain Relief?"

Two Mayor Clinic psychiatrists report on the effect of the use of ACTH and cortisone.

Science News Letter 59:51, Jan. 27, '51. "ACTH Conquers Child Ill."

Tells of results obtained from using ACTH for rheumatic heart disease.

Science News Letter 59:147, Mar. 10, '51. "Hormones from Tomatoes."

A forecast that the pregnenolone compound converted from tomato plants will be used to make cortisone.

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STH, a somatotrophic hormone, gives evidence of increasing resistance to bacterial invaders.

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What ACTH, cortisone, and other hormones can do to help combat various diseases.

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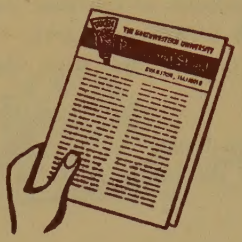

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